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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,715	04/18/2005	Takeshi Kuwabara	F-8643	1453
28107 7590 08/22/2007 JORDAN AND HAMBURG LLP 122 EAST 42ND STREET SUITE 4000 NEW YORK, NY 10168			EXAMINER MERKLING, MATTHEW J	
			ART UNIT 1764	PAPER NUMBER
			MAIL DATE 08/22/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,715

Applicant(s)

KUWABARA ET AL.

Examiner

Matthew J. Merkling

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16, 24, 26 and 27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16, 24, 26 and 27 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a). Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 4/18/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claims Analysis

1. It is noted that claims 1-24 are recited as a "system" which does not clearly set forth which statutory category the invention belongs. It has been determined that the claims are directed to an apparatus and the appropriate principles for interpreting claims for that particular category of invention have been applied.

Claim Objections

2. Claim 11 is objected to because of the following informalities:

In line 3 of claim 11, the term "the surplus steam" is used. There is no definition of this term in the instant claim or the parent claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 3-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Tetsuo (JP 10-308230).

Regarding claim 1, Tetsuo discloses a self-oxidation internal heating steam reforming system (abstract) comprising:

a steam generator (boiler, (6)) comprising a combustion section (burner, (10)) for combusting an air-fuel mixture obtained by mixing a combustion air (94) with a fuel (town gas, (4) and fuel cell exhaust gas (13)), thereby heating water by a combustion gas generated in the combustion section to generate steam ([0003]);

a first sucking mixer (ejector, (53)) for sucking a raw material gas (4) into a steam stream (31) coming from the steam generator (6); and

a reformer (48) for oxidizing the raw material gas contained in the raw material-steam mixture by an oxygen-containing gas (compressed air, (89)) supplied externally (see Drawing 3).

Regarding claim 3, Tetsuo, as discussed in claim 1 above, further discloses a CO reducer (shift converter, (11)).

Regarding claims 4, Tetsuo, as discussed in claim 1 above, further discloses a heat exchanger (boiler, (10)) configured to heat a heating medium (steam/water) using a combustion flue gas (5, 9) discharged from the combustion section (see Drawings 1, 2, 3, 4).

Regarding claims 5 and 6, Tetsuo, as discussed in claim 1, further discloses a heat exchanger (condenser, (66)) that preheats water for steam generation is located to a reformed gas conduit (see Drawing 3) and located downstream of the CO reducer (11).

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Regarding claim 7, Tetsuo, as discussed in claim 1 above, further discloses the steam generation system is constructed such that excess steam can be sent (via conduit (71)) to heat another medium (evaporation of the refrigerant [0037]).

Regarding claim 8, Tetsuo, as discussed in claim 7 above, further discloses the heating medium (61) is water ([0013]) held in a hot water tank (47) in which a main hot water chamber (tank, 47) is communicated with an auxiliary chamber (conduit) and that surplus steam is supplied to be in heat exchange with the auxiliary chamber (see Drawing 1).

Regarding claim 9, Tetsuo, as discussed in claim 1 above, further discloses the reformed gas is supplied to a fuel cell (21).

Regarding claim 10, Tetsuo, as discussed in claim 9 above, further discloses an electrode (anode) flue gas (13) is sent as fuel to the combustion section (10).

Regarding claim 26, Tetsuo, as discussed in claim 1 above, further discloses:

the reformed gas is supplied to a fuel cell (see flow diagram of Figs. 1-5);
and

a recycler (see Drawings 3 and 4) for supplying at least a part of an anode flue gas (13) discharged from the fuel cell as the raw material (instead of raw material from (4)) gas is disposed.

5. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Kobayashi et al. (US 5,094,926).

Regarding claim 1, Kobayashi discloses self-oxidation internal heating steam reforming system (abstract) comprising:

a steam generator (evaporator, (38)) comprising a combustion chamber (30) for combusting an air-fuel mixture obtained by mixing a combustion air (46) with a fuel (41a), thereby heating water by a combustion gas generated in the combustion section to generate steam (See Fig. 1 Flow diagram);

a first sucking mixer (ejector, (34)) for sucking a raw material gas (35) into a steam stream (40) coming from the steam generator (38); and

a reformer (26) for oxidizing the raw material gas contained in the raw material-steam mixture by an oxygen-containing gas (compressed air, (41b)) supplied externally (see Fig. 1).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tetsuo (JP 10-308230).

Regarding claim 2, while Tetsuo discloses the use of a "sucking mixer" (ejector) as a preferable way of controlling the ratio of fuel/air ratio ([0004]), Tetsuo fails to explicitly disclose a second sucking mixer for mixing the fuel and combustion air.

It would have been obvious to one of ordinary skill in the art at the time of the invention to add a second sucking mixer to the fuel and combustion air inlet of the steam generator in order to preferable control the fuel/air ratio.

Regarding claim 11, Tetsuo, as discussed in claim 10 above, further discloses the system is constructed so as to comprise a mixing section (53) for mixing at least a part of the surplus steam (31) to the anode flue gas of the fuel cell (see Fig. 2); a heat exchanger (34) for dewatering a mixture obtained in the mixing section by cooling the mixture using other heating medium (water from (6)) to condense moisture; and a heat exchanger (29) for reheating the dewatered mixture using the mixture entered the mixing section. Tetsuo, however fails to explicitly disclose the mixture stream being introduced to the combustion section.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use this mixture stream (which contains unreacted hydrogen) to the combustion section in order to maximize thermal efficiency of the system.

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9. Claims 12-16, 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tetsuo (JP 10-308230) as applied to claim 1 above, and further in view of Maruko (JP-2001-192201 A, with English equivalent US 6,506,359).

Regarding claims 12-16, 24 and 27 while Tetsuo discloses a self-oxidation internal heating steam reforming system, with reformed gas supplied to a fuel cell (21), and anode flue gas discharged from the fuel cell is supplied (via conduit 13) to the fuel of the steam generator, Tetsuo fails to teach a structure of the reformer that provides efficient use of thermal energy and a mixed catalyst bed with reforming and oxidation catalyst and a heat exchanger disposed in the shift catalyst bed for preheating the anode gas.

Maruko discloses a structure for a steam reforming apparatus that is compact in size and efficiently uses thermal energy in the reforming process (col. 1 lines 16-42).

Maruko teaches a reformer that comprises

- a first reaction chamber (51) and a second reaction chamber (24) separated from each other by a heat-conductive partition (2);

- the first reaction chamber (51) is provided with a raw material feed section (49) for supplying the raw material-steam mixture (col. 7 lines 33-37) at one end and a discharge section (4) at the other end respectively, while packing a steam reforming catalyst bed (col. 7 lines 38-39) therein; and

- the second reaction chamber (2) is provided with a raw material feed section (38) and an oxygen-containing gas introduction section (39) communicating with the discharge section (4) of the first reaction chamber

(51) at one end and a discharge section (23) at the other end respectively, where the inside of the second reaction chamber is packed sequentially with a mixed catalyst bed (52) prepared by mixing a steam reforming catalyst with an oxidation catalyst at the raw material feed section (col. 6 lines 2-8) side, a heat-transfer particle bed (24) at the middle section, and a shift catalyst bed (25) at the discharge section side, wherein;

the first reaction chamber (51) is packed with a heat-transfer particle bed (52') at the raw material feed section side, a steam reforming catalyst bed (51) at the discharge section side, while making the heat transfer particle bed in the first reaction chamber, the heat transfer particle bed in the second reaction chamber, and the shift catalyst bed face with each other via the respective partition walls (see Fig. 5) that extend up to the top of said second reaction chamber and preheat the incoming gas (see Fig. 5, 33); and

the plurality of partition walls (see Fig. 5) have fixed ends joining with each other at respective edge sections at the raw material feed section and the discharge section (see Fig. 5), while having free ends not having been joined with each other at the opposite end sections (see Fig. 5).

It would have been obvious to one of ordinary skill in the art at the time of the inventions to change the reformer structure of Tetsuo with a separate reforming vessel and separate CO reduction vessel and implement the reformer/CO reducer of Maruko in order to more efficiently use the thermal energy.

Regarding claims 15 and 16, the claimed structural limitations do not incorporate any new material but simply re-arrange the claimed apparatus into

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a "package structure". It would have been obvious to one of ordinary skill in the art at the time of the invention to re-arrange the self-oxidation internal heating steam reforming system to meet the needs of a certain "package structure".

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Merkling whose telephone number is (571) 272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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